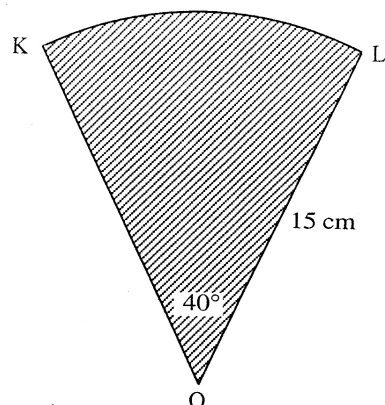


## 7. The Circle

*NB There is considerable overlap between these questions and those on Pythagoras and Trigonometry.*

1. Sector KOL of a circle centre O and radius 15 centimetres is shown opposite.

Calculate the area of this sector.

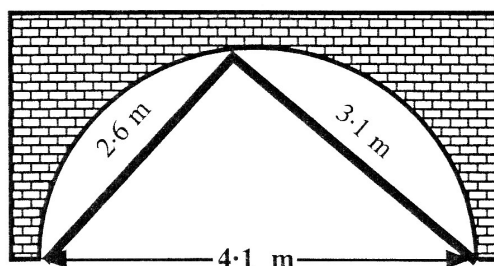


2 KU

2. The central semi-circular archway under a bridge is to be strengthened.

While the work is being carried out, 2 metal beams are to be set in place to support the archway.

For safety reasons, the beams have to just meet on the circumference of the arch.

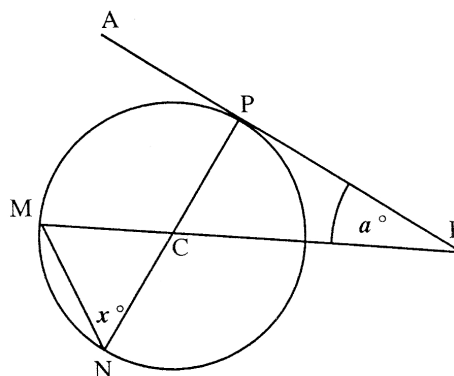


Will the beams fit this archway which is 4.1 metres wide ?


4 RE

3. AB is a tangent to the circle with **centre C**. It meets the circle at the point P.

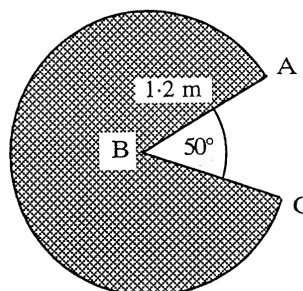
Use the information in the diagram to find an expression for  $x$  in terms of  $a$ .



3 RE

4.  June is replacing the fabric on her garden parasol. She uses a sector of a circle, with radius 1.2 metres.

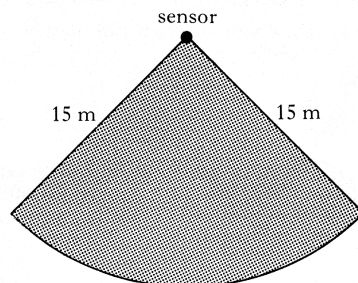
Calculate the area of fabric needed to replace the old material.



4 KU

5. A sensor in a security system covers a horizontal area in the shape of a sector of a circle of radius 15 m.

The area of the sector is 200 square metres.  
Find the length of the arc of the sector.



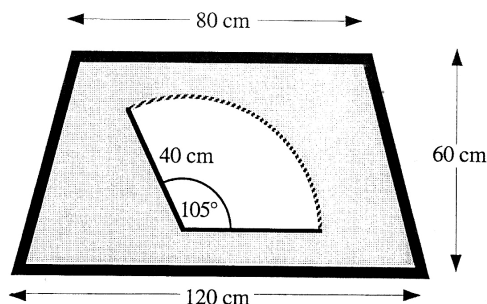
4 RE

6. The diagram shows the rear wiper on a car's back window.

The rear glass is in the shape of a **trapezium** with sizes given.

The wiper blade is 40 centimetres long and it sweeps through an angle of  $105^\circ$ .

Calculate the area of glass **NOT** cleaned by the wiper blade.

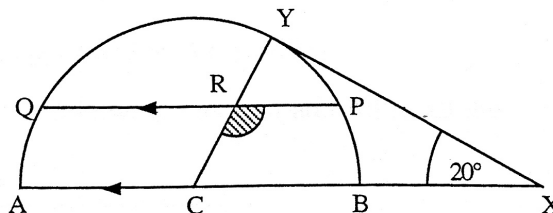


4 RE

7. In this diagram, AB is the diameter of the circle, centre C.  
X is a point of the line AB extended.  
XY is a tangent from X.  
QP is parallel to AB.

If  $\angle YXC = 20^\circ$ , calculate the size of the shaded angle ( $\angle PRC$ )

(*explain how you produced your answer*)



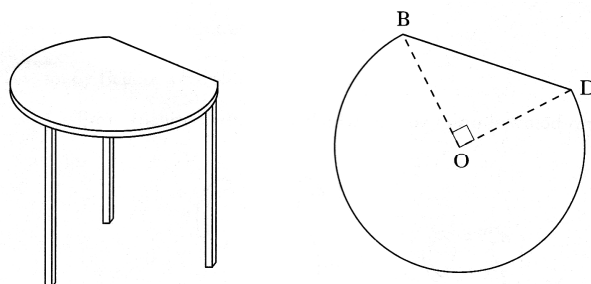
3 KU

8. The diagram shows a table whose top is in the shape of part of a circle with centre, O, and radius 60 centimetres.

BD is a straight line.

Angle BOD is  $90^\circ$ .

Calculate the perimeter of the table top.



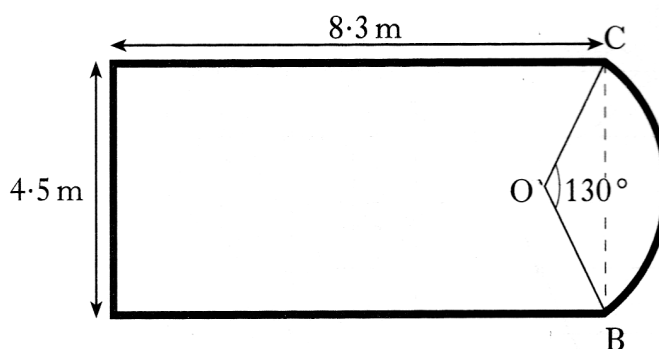
3 RE

9. The diagram shows a ceiling in the shape of a rectangle and a segment of a circle.

The rectangle measures 8.3 metres by 4.5 metres.

OB and OC are radii of the circle and angle BOC is  $130^\circ$ .

- a) Find the length of OB.



2 RE

A border has to be fitted around the perimeter of the ceiling.

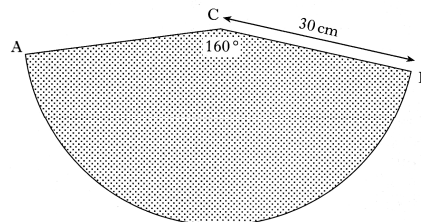
- b) Find the length of border required.

4 RE

10. The diagram shows a sector of a circle, centre, C.

Angle ACB is  $160^\circ$ ,  
and the radius of the circle is 30 cm.

Calculate the length of the arc AB.



3 KU

11. The diagram shows the design of an earring.

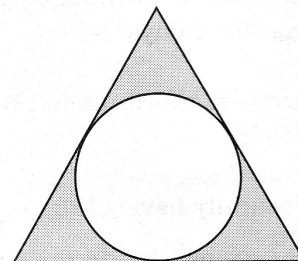
The earring consists of a circle  
inside an equilateral triangle.

The sides of the triangle are tangents to the circle.

The radius of the circle is 8 mm

The distance from the centre of the circle  
to **each** vertex of the triangle is 17mm.

Calculate the perimeter of the triangle.



4 RE

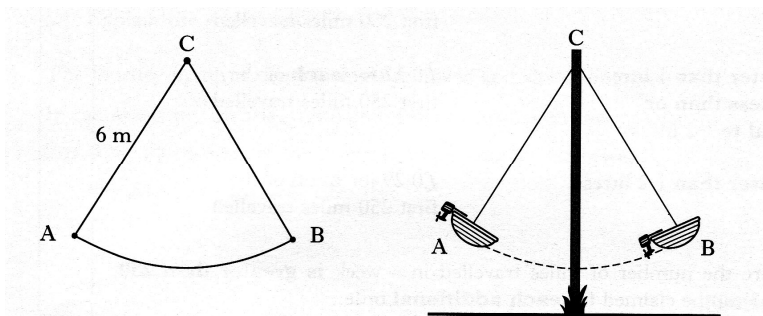
12. The boat on a carnival ride travels along an arc of a circle, centre C.

The boat is attached to C  
by a rod 6 metres long.

The rod swings from position CA  
to position CB.

The length of the arc AB is 7 metres.

Find the angle through which the  
rod swings from position A to position B.



4 RE

13. The diagram shows a tent.

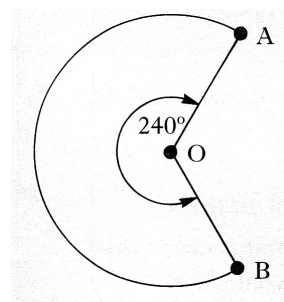
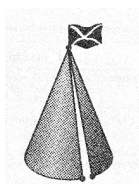
The shape of the material used  
to make the tent is a sector of a  
circle as shown in the diagram.

O is the centre of the circle.

OA and OB are radii of length 3 metres.

Angle AOB is  $240^\circ$

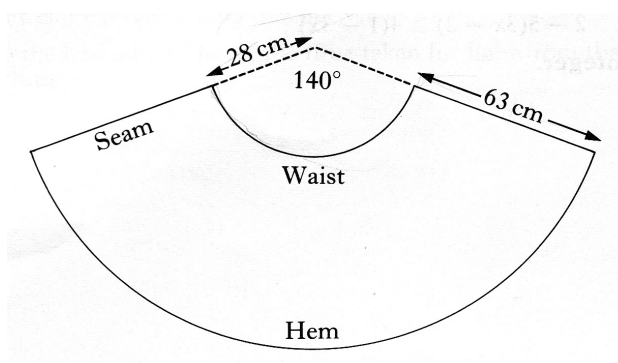
Calculate the area of this piece of material.



3 KU

14. The pattern for a skirt consists  
of part of the sector of a circle.

Calculate the length of the waist  
shown on the pattern.

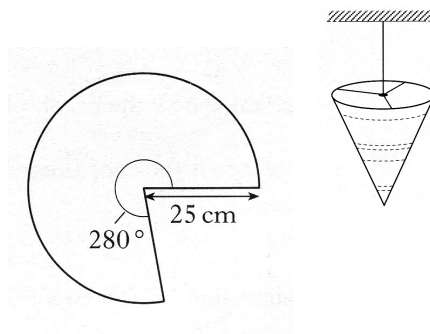


3 KU

15. A lampshade is made in the shape of a cone, as shown.

The shape of the material used for the lampshade is a sector of a circle.

The circle has radius 25 centimetres and the angle of the sector is  $280^\circ$

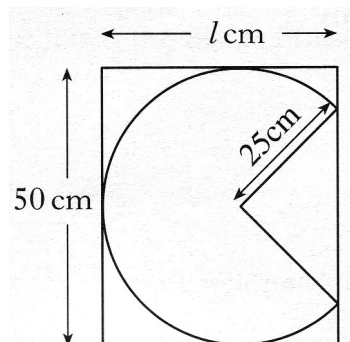


- a) Find the area of the sector of the circle.

3 KU

Each sector is cut from a rectangular piece of material, 50 centimetres wide.

- b) Find to the nearest centimetre the minimum length  $l$ , required for the piece of material.

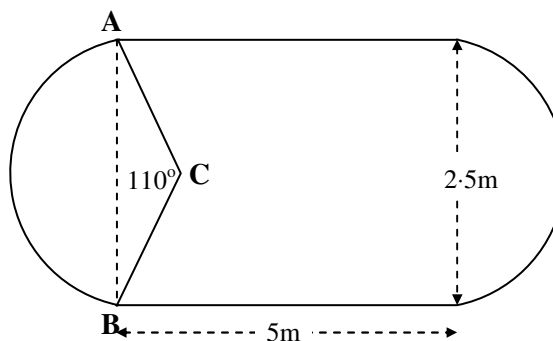


4 RE

16. A large shop display table is in the shape of a rectangle with a circle segment at both ends, as shown in the diagram below.

The rectangle at the centre measures 5 metres by 2.5 metres.

AC and BC are radii of the circle and angle ACB is  $110^\circ$ .



- (a) Show that AC, the radius of the segment, is 1.53 m correct to 3 significant figures.
- (b) To stand comfortably around this table it is estimated that an average person requires 75 cm of table edge.

3 RE

How many people can stand comfortably at the table described above?

4 RE